Schemas for Narrative Generation Mined from Existing Descriptions of Plot*

Pablo Gervás[1], Carlos León[2], and Gonzalo Méndez[2]

1 **Instituto de Tecnología del Conocimiento, Universidad Complutense de Madrid**
Ciudad Universitaria, 28040 Madrid, Spain
pgervas@ucm.es

2 **Facultad de Informática, Universidad Complutense de Madrid**
Ciudad Universitaria, 28040 Madrid, Spain
{cleon,gmendez}@ucm@ucm.es

Abstract

Computational generation of literary artifacts very often resorts to template-like schemas that can be instantiated into complex structures. With this view in mind, the present paper reviews a number of existing attempts to provide an elementary set of patterns for basic plots. An attempt is made to formulate these descriptions of possible plots in terms of character functions, an abstraction of plot-bearing elements of a story originally formulated by Vladimir Propp. These character functions act as the building blocks of the Propper system, an existing framework for computational story generation. The paper explores the set of extensions required to the original set of character functions to allow for a basic representation of the analysed schemata, and a solution for automatic generation of stories based on this formulation of the narrative schemas. This solution uncovers important insights on the relative expressive power of the representation of narrative in terms of character functions, and their impact on the generative potential of the framework is discussed.

1998 ACM Subject Classification F.4.1 Knowledge Representation Formalisms and Methods

Keywords and phrases Narrative generation, conceptual representation of narrative, character functions, plot, narrative schemas

Digital Object Identifier 10.4230/OASIcs.CMN.2015.54

1 Introduction

Computational generation of literary artifacts very often resorts to template-like schemas that can be instantiated into complex structures. This approach has been addressed in the story generation field as a number of computational systems following a grammar-based design [9, 6, 5].

With this view in mind, the present paper reviews a number of existing attempts to provide an elementary set of patterns for basic plots. None of these attempts have been accepted as generally valid. To a large extent, they rely on oversimplification – reducing plot to a very abstract outline that conforms to a great number of story but characterises none of them –, or they focus on particular aspects of a given story – to the detriment of others – so it can be reduced to a schema that matches a larger number of stories. Such characteristics may play against the usefulness of any particular one of them as single framework for the description or classification of stories. However, considered as a whole, they can be understood

* This work was partially supported by FP7 WHIM project Grant Agreement 611560.

6th Workshop on Computational Models of Narrative (CMN'15).
Editors: Mark A. Finlayson, Ben Miller, Antonio Lieto, and Remi Ronfard; pp. 54–71

OpenAccess Series in Informatics
Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

Table 1 The Seven Basic Plots as described by Booker.

Overcoming the Monster	hero sets out to confront a monster and eventually defeats it
Rags to Riches	hero starts from humble beginnings and eventually achieves happiness
The Quest	hero sets out to fulfill a quest
Voyage and Return	hero sets out on a journey and returns having matured in the process
Comedy	initial confusion involving love relationships is eventually resolved happily
Tragedy	traces the fall from grace of a particular character to a tragic ending
Rebirth	main character almost falls from grace but repents at the last minute

as a basic abstract vocabulary to describe different plots. In the context of automated story generation, such a vocabulary would be very useful in at least two different senses:

- it may provide an agreed vocabulary for describing what type of story is desired, e.g. "a vengeance story" or "a quest story"
- it may provide a basic skeleton that the desired story should satisfy, regardless of any additional complexity that may be introduced to enrich it

In order to address needs of this kind, the present paper attempts to formulate these descriptions of possible plots in terms of schemas that may be used to drive the Propper system, an existing framework for computational story generation. The paper also explores the set of extensions required to the original set of character functions to allow for a basic representation of the analysed schemata. This is intended as a proof of concept to test the initial hypothesis of the usefulness of such schemas in the context of story generation. The Propper system [3, 4] is a computational implementation of the procedure for generating stories described by Vladimir Propp [8] as a possible use of his classic formalization of the morphology of the folk tale.

Once the various descriptions for plot are available as schemas that can be used to drive the Propper system, the impact of using them instead of - or as well as - the original canonical sequence for folk tales is discussed in terms of whether it expands the generative potential of the Propper system.

2 Review of Previous Work

This section reviews some of the existing proposals for the schematisation of possible story plots, the Proppian morphology of a folk tale, and the Propper system for story generation. Later sections bring these ingredients together to propose a computational model of narrative that can consider input in terms of the reviewed plot schemas and produces matching stories.

2.1 Some Existing Descriptions of Schemas for Plot

Christopher Booker [2] proposes that there are seven basic plots such that all possible stories can be seen as instantiations of these. The seven plot in question are described briefly in Table 1. These descriptions attempt to capture the basic outline for purposes of reference, more detailed descriptions follow below.

Table 2 20 Master Plots as presented by Tobias.

Quest	hero sets out to fulfill a quest
Adventure	much like a Quest but with less focus on a particular goal and more action
Pursuit	hero is pursued and eventually manages to escape
Rescue	hero rescues a victim imprisoned by a villain
Escape	like Rescue but the protagonist is the victim and eventually escapes by his own means
Revenge	protagonist sets out to avenge a villainy
The Riddle	involves solving a riddle (reader should try to solve it before the protagonist)
Rivalry	a protagonist and an antagonist of balanced power clash, protagonist wins
Underdog	as in Rivalry but protagonist is at disadvantage and wins through tenacity
Temptation	maps the fight of protagonist against temptation, from initial fall to eventual success
Metamorphosis	protagonist suffers a curse that transforms him into a beast, but love releases him eventually
Transformation	faced with a crisis, protagonist suffers transformation with important effects (usually at a price)
Maturation	tracks immature character through challenging incidents to maturity (usually achieved at a price)
Love	maps the progress of a love relation from initial obstacles to final fulfillment (if test passed)
Forbidden Love	as in Love but around an unconventional love relation (usually adultery) which ends badly
Sacrifice	tracks transformation of main character from low to high moral state, leading to a final sacrifice
Discovery	protagonist discovers himself
Wretched Excess	traces psychological decline of a character based on a character flaw
Ascension	protagonist faces a moral dilemma and undergoes ups and down till he reaches success
Descension	as in Ascension but followed to final disaster

An important point to note is that these plots are not mutually exclusive. Any given narrative may combine several of them into its overall structure, with some of these subplots possibly focusing on different characters.

Tobias [10] proposes the existence of 20 master plots. His book is more oriented towards instruction on how to build instances of these plots. A relevant insight presented here is that plots can be divided into plots of the body – involving mainly action – and plots of the mind – involving psychological development of the characters. Brief descriptions of these 20 master plots are provided for reference in Table 2.

The 20 plots by Tobias are even more difficult to keep separate from one another in practical terms. In terms of actual events in the narrative, quests or adventures are very likely to include elements of pursuit, rescue, escape, rivalry, revenge, temptation, sacrifice, or some character being an underdog at some stage. In terms of character development,

they may also include transformation, maturation, or discovery. Much the same may be said about love stories. Our understanding it that a plot is considered to satisfy one of these labels only if the label is applicable to the main structure of the plot.

Georges Polti [7] proposed 36 dramatic situations, following Gozzi's assertion that there can only be thirty six tragic situations. These situations are briefly described for reference in Table 3, although Polti divides each of them into a series of classes and sub-classes that are further described or exemplified in the referenced book.

These 36 situations can be combined in the same story, since they must be understood as an outcome of previous events in the story, when the intervening characters come together and the main character in the situation must face a decision to be made, a change to be suffered or an obstacle to be overcome.

2.2 Proppian Morphology of a Story

At the start of the 20th century, Vladimir Propp [8] identified a set of regularities in a subset of the corpus of Russian folk tales collected by Afanasiev [1]. These regularities he formulated in terms of *character functions*, understood as acts of the character, defined from the point of view of their significance for the course of the action. Character functions are so named because, in Propp's understanding, they represent a certain contribution to the development of the narrative by a given character. According to Propp, for the given set of tales, the number of such functions was limited, the sequence of functions was always identical, and all these fairy tales could be considered instances of a single structure.

The set of character functions includes a number of elements that account for a journey, a number of elements that detail the involvement of the villain – including the villainy itself, some possible elaborations on the struggle between hero and villain, and a resolution –, a number of elements that describe the dispatching of the hero, a number of elements that describe the acquisition of a magical agent by the hero, and a number of elements concerned with the progressive unveiling of the hero's role in opposition to a false hero.

It is less well known that Propp provides in his book a very clear description of how his morphology could be used for story generation.

2.3 The Propper System

The Propper system developed by Gervás [3] constitutes a computational implementation of a story generator initially based on Propp's description of how his morphology might be used to generate stories.

It relies on the following specific representations for the concepts involved:

- a *character function*, a label for a particular type of acts involving certain named roles for the characters in the story, defined from the point of view of their significance for the course of the action
- a sequence of character functions chosen as backbone for a given story
- possible instantiations of a character function in terms of specific *story actions*, involving a number of *predicates* describing events with the use of *variables* that represent the set of characters involved in the action

Based on these representations the Propper system defines a procedure that first chooses a sequence of character functions to act as abstract narrative structure to drive the process, and then progressively selects instantiations of these character functions in terms of story actions to produce a conceptual representation – in terms of an ordered sequence of predicates – of a valid story.

Table 3 The 36 dramatic situations as described by Polti.

Supplication	power in authority must choose between a persecutor and a suppliant
Deliverance	protector comes to the rescue of the distressed
Crime Pursued by Vengeance	avenger executes a vengeance on a criminal
Vengeance taken for kindred upon kindred	avenger and the criminal are kin
Pursuit	hero is pursued by an abstract peril or punishment
Disaster	a power is defeated by an enemy or catastrophe
Falling Prey to Cruelty of Misfortune	hero suffers a cruel master or misfortune
Revolt	hero is a conspirator that intrigues against a tyrant
Daring Enterprise	hero attempts to recover an object or person from an adversary
Abduction	hero rescues an abducted victim from its abductor
The Enigma	a combat of the intelligence to find a person or object
Obtaining	aim to be achieved through eloquence and diplomacy
Enmity of Kinsmen	kinsmen transform love into (usually) mutual hatred
Rivalry of Kinsmen	a desired person causes a kinsman to hate another
Murderous Adultery	a betrayed husband or wife kills one or both adulterers
Madness	a madman slays, injures or brings disgrace onto a victim
Fatal Imprudence	imprudence or curiosity as the cause of a loss
Involuntary Crimes of Love	character unknowingly commits adultery or incest
Slaying of a Kinsman Unrecognized	unrecognized victim is slain by a kinsman
Self-Sacrifice for an Ideal	hero sacrifices life, love or well-being to a cause
Self-Sacrifice for Kindred	hero makes sacrifices for happiness of a relative
All Sacrificed for Passion	character makes sacrifices for a vice or passion
Necessity of Sacrificing Loved Ones	hero sacrifices a loved one for a necessity or vow
Rivalry of Superior and Inferior	two masculine or feminine rivals with different rank
Adultery	a deceived husband or wife
Crimes of Love	a lover and beloved incur in questionable acts
Discovery of the Dishonor of a Loved One	a character discovers the shame of a loved one
Obstacles to Love	marriage prevented by social norms
An Enemy Loved	one of two lovers is hated by kinsmen of the other
Ambition	character tries to obtain a good guarded by an adversary
Conflict with a God	a mortal struggles with a deity
Mistaken Jealousy	a character is jealous of another
Erroneous Judgement	any kind of mistaken judgement
Remorse	a culprit suffers remorse for a crime or love fault
Recovery of a Lost One	a hero struggles to find a lost, loved one
Loss of Loved Ones	a character witnesses the death of a loved one

Table 4 Set of character functions employed as canonical sequence.

test by donor	difficult task
hero reaction	branding
acquisition magical agent	victory
villainy / lack	task resolved
hero dispatched	trigger resolved
begin counteraction	return
acquisition magical agent	hero pursued
departure	rescue from pursuit
test by donor	unrecognised arrival
hero reaction	unfounded claims
acquisition magical agent	false hero exposed
transfer	transfiguration
trigger resolved	branding
unrecognised arrival	villain punished
unfounded claims	hero marries
struggle	

To fulfill Propp's description of the morphology of a folk tale, the sequence of character functions that acts as backbone for a story has to be a subset of the character functions listed by Propp, appearing in a relative order that conforms with a given canonical sequence. The actual set of character functions employed as canonical sequence is given in Table 4. Character functions are presented in two columns by their abbreviated name. A key point in the canonical sequence is the **villainy / lack** pair of character functions written in bold. These differ from all the others in that only one of them is ever included in any single story, and all stories must contain either one or the other.

From a given sequence of character functions, the system defines a *fabula*, a sequence of states that contain a chain of story actions – which are instances of those character functions. A story action involves a set of preconditions – predicates that must be present in the context for continuity to exist –, and a set of postconditions – predicates that will be used to extend the context if the action is added to it. Each story action is linked to its context of occurrence by having its preconditions satisfied by the preceding state. The initial state by default incorporates all predicates of the first action, and each valid action added to the fabula generates a new state that incorporates all predicates of the previous state, plus the predicates of the new action. To evaluate whether the preconditions of a story action are satisfied by the context, they are unified with the set of predicates that hold in that state.

The revised version described in [4] describes extensions to the original constructive procedure that take into account the possibility of dependencies between character functions – such as for instance, a kidnapping having to be resolved by the release of the victim – and the need for the last character function in the sequence for a story to be a valid ending for it.

3 Describing Existing Schemas for Plots in Terms of Proppian Character Functions

We want to attempt to unify the material reviewed in Section 2 into a single representation that is compatible with the existing framework of the Propper system. As the Propper system is driven by Proppian character functions, we will consider whether the schemas

arising from the approaches reviewed can be described as sequences of character functions as described by Propp, and what extensions might be required for a better fit.

3.1 Establishing a Common Vocabulary from the Set of Taxonomies

The different sets of plots reviewed in Section 2.1 show a certain overlap in some cases (both Booker and Tobias include a plot based on a quest, for instance). Where they differ, it would be ideal to establish some way in which the elements in one set might be related to elements in the other, either as more specialised or more abstract versions.

When trying to cross-relate these various taxonomies with one another, it becomes apparent that they are formulated at different levels of abstraction, and focused on different aspects of the plot. This makes it difficult to find a clear correlation between them. However, for the purposes of our paper – which aims at making it possible to rely on these descriptions to specify desired stories and/or drive the process of their construction – it becomes important to be able to understand how elements from these descriptions might combine or interact.

In that sense, a number of patterns can be identified. Tobias' and Booker's plots can be related as follows:

- Tobias' plots of Temptation, Metamorphosis, Transformation, Maturation and Discovery could fit Booker's description of Rebirth plots.
- Tobias' plots of Pursuit, Rescue, Escape, Rivalry, Underdog, Revenge, Sacrifice might be employed to articulate what Booker describes as an Overcoming the Monster plot.
- Tobias' Love plot correlates nicely with Booker's Comedy plot.
- Tobias' plots of Wretched Excess, Descension, Forbidden Love, and, possibly, Sacrifice might fit Booker's Tragedy plot.
- Tobias plot of Ascension fits Booker's Rags to Riches plot.
- Tobias' plots of Transformation, Maturation and Discovery could apply as descriptions of character development implicit in Booker's description of Quest, Voyage and Return, Rags to Riches and Rebirth plots.

Polti's dramatic situations are not presented as candidates for complete plots, but rather as situations with dramatic potential that may arise within a given plot. In this sense, they are easier to place with respect to the other two proposals considered in this paper. In a sense, they constitute a finer grained vocabulary for describing plot elements that may occur in larger plot structures. For this reason, some of them show a surprising match with those plots of Tobias' that we have described as elements sometimes used as ingredients being expanded into full independent plots, such as Pursuit – which appears in both Tobias' and Polti's lists –, or Deliverance in Polti closely matching Rescue in Tobias.

For this set of situations, the task to be considered becomes more to identify where in the more elaborate structures these situations appear.

3.1.1 Paraphrasing Plot Options in Terms of Character Functions

Booker's set of seven plots can be easily paraphrased in terms of Proppian character functions. One such paraphrase of them is given in Table 5. There are some differences. Where Propp considers a fixed sequence of character functions from which a selection can be picked out, Booker's descriptions differ in at least two ways. First, they sometimes allow for more than one possible relative ordering between some of the elements included. In the table, this has been represented by placing between brackets those elements that may occur in interchangeable order or that are optional. Second, Booker's descriptions include a certain possibility of some subsequences reoccurring repeatedly over the same plot. In the table,

Table 5 Paraphrases of Booker's 7 basic plots in terms of Proppian character functions.

Overcoming the Monster	(villainy*, MONSTERS*), struggle, victory, villain punished, hero marries
Rags to Riches	lack, departure, transfiguration, hero marries
The Quest	(hero dispatched, difficult task), departure, (MONSTERS*, HELPER*), task resolved
Voyage and Return	departure, ((difficult task, task resolved), (MONSTERS*, HELPER*)), return
Comedy	lack, (transfiguration, unrecognised arrival), (difficult task, task resolved)*, (hero recognised), transfiguration, hero marries
Tragedy	(villainy*, MONSTERS*), struggle, victory, villain punished
Rebirth	(villainy*, MONSTERS*), *repentance*, *repentance rewarded*

such subsequences have been replaced with labels in capital letters that have been defined separately. It may pay to abstract them into higher order labels that can appear within more structured sequences. They correspond to:

- MONSTERS: struggle, hero pursued, (victory, rescue from pursuit)
- TESTERS: test by donor, hero reaction, acquisition magical agent

Where certain character functions (or labels for subsequences) can occur more than once according to Booker, these have been marked with an asterisk *. The case of Tragedy and Rebirth is strikingly different. Both can indeed be phrased in terms of Proppian character functions as shown in the table. However, this requires a slight revision of the Proppian concept of character function. Proppian character functions assume a fixed set of roles, namely a hero, a villain and some auxiliary characters such as dispatcher, a donor, a helper... But in Proppian functions, the protagonist of the story is assumed to be always the hero. In the case of Booker's Tragedy and Rebirth, the paraphrase works only if the protagonist is considered to be the villain. This implies that the Tragedy plot would correspond to an instance of the Overcoming the Monster plot but told from the point of view of the villain. It is important to note that the occurrence of the victory character function now implies that the protagonist is defeated, which is contrary to Propp's original interpretation. The Rebirth plot requires a more elaborate reworking to be phrased in terms of Proppian functions, because it involves a particular turn in the story that was not originally contemplated by Propp. This is the point in the narrative where the villain sees the light, repents, and redeems himself. New character functions would need to be introduced to cover this process, as it plays a fundamental role in such stories that would definitely need capturing. We refer to these character functions as *repentance* and *repentance rewarded*, and we include them as such in the table.

The Comedy plot requires a special analysis. It may be phrased in terms of Proppian functions, in as much as it starts from an initial lack – though specifically related to love, lack of a love partner, lack of attention from the chosen partner, or lack of permission to marry the chosen partner –, it involves solving a difficult task – related to the corresponding lack –, and it ends with the hero marrying. However, the description of this plot provided by Booker addresses the corresponding story at a level of detail that cannot be covered appropriately with Proppian functions, at least in the sense that these had been defined within the Propper system. To deal with this case, we would need a system with the following features:

Table 6 Paraphrases of the Elementary Plots of Tobias' in terms of Proppian character functions.

Pursuit	hero pursued, rescue from pursuit
Rescue	villainy, trigger resolved
Escape	villainy, trigger resolved [protagonist is victim, not hero!]
Revenge	villainy, villain punished
The Riddle	difficult task, task resolved
Rivalry	struggle, victory
Underdog	struggle, victory [protagonist at disadvantage]

- the ability to explicitly represent the gender of characters[1], as the core of the plot revolves around love relations between characters
- the ability to represent shifts in affinity between characters and to have these shifts arising from and triggering events in the narrative
- the ability to consider a number of interwoven subplots focused on different characters

Such features are beyond the scope of the present paper but they will be considered for future work. Nevertheless, a basic sketch of the Comedy plot in terms of Proppian functions has been provided for completeness.

According to Booker's description of his plots, the paraphrases given in Table 5 constitute a sketch of the main events that characterise each of the plots. The fleshing out of these plots into specific actual stories may involve combining more than one plot, in which case the corresponding sequences of character functions may intermingle as different narrative threads. When such task is attempted computationally, some means must be provided for keeping track of which characters play which roles in which of these threads, and whether any given character can play different roles in different threads. This is beyond the scope of the present paper and it is currently left for future work.

As discussed in Section 3.1, the elements described by Tobias amongst his 20 master plots operate at a slightly different level of abstraction from those used by Booker. In a certain sense, they correspond to focusing the plot of a complete story on particular types of situation that were occurring as parts of the plots considered previously. The correspondences already established between Booker's and Tobias' plots introduce a change in the overall task definition. Given that many of the plot descriptions given by Tobias can be seen as specific instances of Booker's plots, it is less useful to paraphrase them in terms of Proppian functions – the paraphrase already given for the corresponding Booker plot might be used in each case – and it becomes more interesting to consider how the different instantiations that Tobias provides might be differentiated from one another in terms of a Proppian description (or what extensions of the Proppian implementation might be required to consider these plots).

Tobias' plots of Pursuit, Rescue, Escape, Rivalry, Underdog, Revenge, Sacrifice can be represented as more specific plots that focus on parts of the sequences of character functions used to describe Booker's plots. A tentative paraphrasing for them is presented in Table 6.

The Quest and Adventure plots can be seen as similar to Booker's The Quest and Voyage and Return. Tobias' Love plot has been linked to Booker's Comedy plot, and so it is subject

[1] Although in current times it might have been more politically correct to phrase this in terms of sexual preferences, we have opted in this desiderata for a more classical approach to character pairings in terms of gender. This might be revised in future work to allow for more generic and politically correct story telling capabilities.

to the same considerations described earlier for that one. The Ascension plot can be mapped to the Rags to Riches plot.

The remaining plots described by Tobias can be grouped into a set of instantiations of the two Booker plots already described that presented significant differences with the Proppian schema: Tragedy and Rebirth.

Forbidden Love is related to Comedy/Love plots in that its main ingredient is a love relationship, and it differs from them in two ways: the love relation in question is one against convention, and it ends badly. As before, this may be implemented using the same set of characters and actions as for comedy, but making the protagonists a pair of characters that do not get paired off in the end. This is similar to the opposition between Overcoming the Monster and Tragedy. In a sense, one could say that Tobias is enriching the set of plots by considering a plot based on love but which can end badly, whereas Booker only considers plots on love that end well.

In a similar opposition, the Descension and Wretched Excess plots could be seen as dark counterparts to the Rags to Riches/Ascension type of plot. These may be paraphrased in terms of Proppian functions by inverting the order in which the functions in the sequence for Rags to Riches occur. However, better results might be obtained if specific character functions are defined to represent: an initial positive situation for the character – corresponding to a positive version of lack –, a character function to discover events in which the fortune of the protagonist suffers, and a final negative situation. This suggests that a reworking of the set of character functions might benefit from a little generalization, so that both positive and negative situations can be described, and events that cause transitions in both positive and negative directions can be represented. Then the opposing pairs of plots may all be represented based on these. The original set of character functions defined by Propp covers only part of this spectrum – it includes no character function for a positive initial situation – and relies on very specific solutions for some particular areas – it links very tightly the final positive situation of the hero with either marriage or coronation, for instance. An effort to broaden this set of character functions would greatly improve the range of possible stories that can be generated. As this requires a heavy effort of knowledge engineering of system resources it is postponed for future work.

Differences between Descension and Wretched Excess can be identified in terms of one being more concerned with material situation of the protagonist, and the other with his/her psychological decline. In marking this difference, Tobias shows a concern with an aspect of plots that had not been considered by either Propp or Booker: the difference between physical and psychological characterization.

The set of plots proposed by Tobias shows an increase in number partly because it distinguishes a number of plots that are based on psychological development of their protagonists – what he describes as plots of the mind – beyond those considered by Propp – which centre almost exclusively on what Tobias calls plots of the body. These plots of the mind are the Temptation, Transformation, Maturation and Discovery plots. The Metamorphosis plot combines such a psychological ingredient with a physical change. In terms of Booker's classification, most of these qualify as Rebirth plots, as they involve a change of the protagonist during the development of the plot. In a certain sense, the Sacrifice plot also includes a similar turning point related to psychological issues, though in this case the change also translates into a physical sacrifice. The differences between the various plots arise from these slight differences in the relative importance of the material and the psychological aspects, or in the specific type of change that the protagonist is subjected to – as described reasonably well by the names of these plots.

Again, the representation of the psychological evolution of characters is beyond the current capabilities of the Propper system, and discussion of an appropriate extension beyond the scope of the present paper, but it will be considered as future work.

With respect to Polti's dramatic situations, these are not so much patterns for complete plots but rather building blocks that may be employed in the construction of plots. In this sense, they are closer to being descriptions of actions of the characters that are significant for the course of the action, which is what Propp's character functions are intended to be. For this reason, when establishing a correspondence that might lead to a common vocabulary for plot descriptions, it would be more useful to consider Polti's dramatic situations as alternative abstractions, closely related to Proppian character functions. A possible alignment between Polti's dramatic situations and Propp's character functions (or groups thereof) is shown in Table 7. The material is presented according to the following criteria. For each line of the table, the first column indicates a character function or a group of character functions that might be considered to correlate in some way with the dramatic situations listed in the second column. The third column is used to indicate specific characteristics that the instantiations of the character functions given in the first column would need to satisfy to properly represent the dramatic situation given in the second column. The bottom half of the table shows dramatic situations that have no direct match to Proppian character functions. For these, it may be worth considering the introduction of specific character functions.

3.2 Extending the Propper System for Schema-Driven Generation

Once a common vocabulary has been agreed that includes elements from the various taxonomies, the Propper system has been extended to take advantage of it.

This implies two basic extensions beyond the previous versions of the system:

- it must accept input in the form of elements from this vocabulary to drive the story that is to be constructed
- it must be capable of producing stories that match the corresponding description

The first extension has been achieved by means of a preprocessing module that, given the name of a given narrative schema, builds a sequence of character functions based on resources along the lines of the tables presented in Section 3.1.1. To build a proof of concept, the complexities of repetition and alternative ordering have not been considered and the initial version focuses on simple instantiations of the more generic sequences. These sequences can now be used as input to the stage of fabula generation of the Propper system, which searches for appropriate instantiations of these character functions in terms of story actions that link into a coherent whole that can be recognisable as a story.

The second extension has proven to be more difficult, but it has also uncovered a number of important insights on the advantages and disadvantages of Propp's framework as a computational model of narrative. Additionally, this effort has prompted a number of improvements that have allowed the system to go beyond Propp's original formulation.

The first insight relates to the fact that most of the sequences required to implement the set of narrative schemas reviewed were already included in the canonical sequence proposed by Propp. This must be considered an important merit of Propp's framework as it implies that the method for story generation outlined by Propp – in terms of selecting character functions from his canonical sequence and instantiating them – would in theory be capable of producing instances of most of the narrative schemas reviewed. The difficulty would lie in how to inform the choices at each point. This is part of the problem that the rest of this section attempts to address.

Table 7 Alligment of Polti's 36 Dramatic Situations with Proppian character functions.

lack	Ambition Recovery of a Lost One Loss of Loved Ones	
lack villainy	Disaster Falling Prey to Cruelty of Misfortune Madness Fatal Imprudence Involuntary Crimes of Love Slaying of a Kinsman Unrecognized Adultery Crimes of Love Discovery of the Dishonor of a Loved One	 (love) (love)
trigger resolved rescue from pursuit	Deliverance	
victory villain punished trigger resolved	Crime Pursued by Vengeance Vengeance taken for kindred upon kindred	
hero pursued	Pursuit	
struggle	Enmity of Kinsmen Rivalry of Kinsmen Rivalry of Superior and Inferior	(psychological)
trigger resolved	Abduction Murderous Adultery	
test by donor hero reaction acquisition / difficult task task resolved	Daring Enterprise The Enigma (temptation or a riddle) Obtaining	
	Self-Sacrificing for an Ideal Self-Sacrifice for Kindred All Sacrificed for Passion Necessity of Sacrificing Loved Ones	(sacrifice) (sacrifice) (sacrifice) (sacrifice)
	Obstacles to Love An Enemy Loved	(love) (love)
	Mistaken Jealousy Erroneous Judgement Remorse	(psychological) (psychological) (psychological)
	Supplication Revolt Conflict with a God	

The second insight concerns the fact that the set of story actions developed to cover the Proppian character functions includes a broad range of possible story actions to instantiate each character function. However, in many cases the specific instances of character function occurring in the context of one of these more specific narrative schemas need to be restricted to a subset of the complete range of possible story actions. For instance, when the character function for *lack* occurs at the beginning of a Rags to Riches schema it works better if instantiated with story actions concerned with hardship or poverty rather than desire for wondrous magical objects, whereas both occur in the context of Proppian tales. When the same character function occurs at the beginning of a Comedy plot, it only works if instantiated with story actions concerned with lack of a love partner, or lack of permission to marry. To address this issue, the module of the Propper system concerned with retrieving possible story actions to instantiate a given character function has been refined to take into account what particular narrative schema is being considered in each case. The knowledge of which story actions are suitable to instantiate which character functions under particular narrative schemas has been encoded explicitly in resources local to these modules. A similar mechanism may be applied to address the more detailed specific instantiation of character functions required to generate instances of Tobias's plots and/or Polti's dramatic situations, as described above.

A third important insight arose from the observation that, whereas the Proppian morphology takes for granted that the protagonist of the stories is always the hero, some of the set of narrative schemas considered focused on the villain as protagonist. Namely, Booker's schemas for Tragedy and Rebirth, and those of Tobias's plots that in the analysis in Section 3.1 have been associated to these two. This presents no problem to our endeavour in as much as the conceptual representation of a story as currently produced by the Propper system is agnostic as to who is the protagonist. This will become apparent in the examples presented later in the paper. This issue of who the protagonist is would have to be taken into account in future work, once the problem of rendering these conceptual representations of stories as text is addressed.

A fourth insight focused on the fact that to obtain sequences of character functions that matched as closely as possible the descriptions of the narrative schemas, certain character functions (or subsequences thereof) might need to occur more than once. This presented problems because not all instances of the available story actions allowed this. For instance, some of the story actions for the *victory* character function allowed the villain to survive the encounter – thereby being available for a second struggle later in the story –, whereas others ended more radically with his demise. This restriction was particularly important to distinguish between the two types of schema where the villain acts as protagonist of the story: instances of the Rebirth narrative schema require the villain to repent at some point in the story and undergo a radical change for good, whereas instances of Tragedy may well end in his utter destruction. From a computational point of view, it required a solution capable of discerning which particular story actions could be used to instantiate a character function at what points of the story. The process for selecting story actions was refined further to take into consideration the relative position of each character function within the narrative schema being considered.

The observed possibility of repeating and combining certain subsequences of character functions to make up more complex schemas led to a fifth insight concerning Propp's morphology. Although the canonical sequence of character functions as described by Propp includes a certain redundancy to allow character functions (or small subsequences of them) to occur at more than one point in the overall narrative arch, the morphology as formalised is too

Table 8 An example story for the Overcoming the Monster narrative schema.

0	character id810
0	torment_at_night id810 id811
0	victim id811
0	character id811
0	misbehaved id810
1	runs_away id811
1	pursues id810 id811
1	demands id810 id811
2	hides id316 id811
2	escapes id811
3	weight_contest id811 id810
3	confrontation id811 id810
4	heavier id811
5	punished id810
5	shot id810
6	marries id811
6	acceeds_to throne id811

rigid to capture appropriately the broad range of narrative schemas that have been reviewed. Propp's insistence that the character functions in his morphology need be considered in a specific order introduces a restriction that reduces the expressive power that it might otherwise have had. This is particularly relevant given that the set of narrative schemas reviewed is by definition a subset of all the possible ones. For this reason, we intend to address as future work alternative possible means of combining these sequences of character functions into complex narrative schemas.

3.3 Examples of Constructed Stories Matching Given Narrative Schemas

Although it would be impossible to include in this paper examples of stories to match all the various narrative schemas reviewed, an effort has been made to cover instances of at least the seven basic plots described by Booker. As the other narratives schemas or dramatic situations have been related back to these seven in the sections above, this should be seen as an indication of the potential of the approach.

The task of extending the knowledge resources of the system to cover the full set of schemas would be significant. The original knowledge engineering effort for the first version of the Propper system, as reported in [3], demonstrated this task to be an important bottleneck for the development of this type of system. As a proof of concept, a basic initial version of the desired approach has been implemented based on the existing resources in terms of related sets of character functions and story action resources. The two new character functions *repentance* and *repentance rewarded* and a small set of possible instantations of them as story actions have been added. The stories that result from this effort are reported below.

Table 8 presents an example of story corresponding to the Overcoming the Monster narrative schema. This particular story has the peculiarity that the system has picked the victim of the initial villainy as the hero of the story.

Table 9 presents an example of story corresponding to the Rags to Riches narrative

Table 9 An example story for the Rags to Riches narrative schema.

0	character id301
0	lack id301 money
1	sets_out id301
2	builds id301 palace
2	new_physical_appearance id301
3	marries id301

Table 10 An example story for the Comedy narrative schema.

0	character id298
0	lack id298 bride
1	puts_on id298 garment
1	deceiving_appearance id298
2	arrives id298 id719
2	location id719
2	disguised id298
2	unrecognised id298
3	sets id157 id298
3	character id157
3	involves difficult_task hiding
4	solve id298 difficult_task
4	before dead_line
5	recognised id298
6	puts_on id298 garment
6	new_physical_appearance id298
7	betrothed id298

schema. This story is indicative of how the simplest structure that conforms to one of these schemas may be insufficient to hold the reader's interest and fleshing out with additional narrative elements may be required.

Table 10 presents an example of story corresponding to the Comedy narrative schema. As indicated above, this is intended only as a baseline. Quality would improve significantly once the complexities outlined earlier as required for Comedy are addressed.

Table 11 presents an example of story corresponding to the Tragedy narrative schema. It is important to note that in this story the protagonist must be considered to be character id775, who plays the role of the villain.

Table 12 present an example of story corresponding to the Rebirth narrative schema. Again, the protagonist of this story is character id805.

The stories for narrative schemas corresponding to The Quest and Voyage and Return as described rely heavily on a combination of a number of incidents. As a result, they turned out to be overlong to be reported within the size limitations of the paper, but the system has been extended to be able to produce them. They also suffer from the rigid sequencing of the various elements involved (struggles with villains, chases, task to solve, encounters with magical helpers). The more flexible solution for the relative ordering of these elements that is being considered as future work would result in better stories.

Table 11 An example story for the Tragedy narrative schema.

0	character id775
0	substitute id775 id776 id777
0	victim id776
0	character id776
0	bad id777
0	misbehaved id775
1	runs_away id776
1	pursues id775 id776
1	demands id775 id776
2	throws id776 id310
2	turns_into id310 id312
2	obstacle id312
2	escapes id776
3	weight_contest id776 id775
3	confrontation id776 id775
4	heavier id776
5	punished id775
5	shot id775

Table 12 An example story for the Rebirth narrative schema.

0	character id805
0	try_to_eat id805 id806
0	victim id806
0	character id806
0	misbehaved id805
1	runs_away id806
1	pursues id805 id806
1	demands id805 id806
2	turns_into id806 id314
2	unrecognisable id314
2	escapes id806
3	play id806 id805 cards
3	confrontation id806 id805
4	wins id806
5	repents id805
6	acceeds_to throne id805

4 Discusion

The extensions that have been required to enable the representation of existing plot schemas as paraphrases in terms of Proppian character functions arose from one of two possible situations:

- the plots in question violated one of Propp's basic premises (which basically involve the protagonist being the hero and the tale having a happy ending)
- the set of character functions did not allow a direct representation of some complication in the plot

The first situation has been easily resolved by allowing the story generation to consider stories that violate Propp's premises. Once the roles in the story have been decoupled from the choice of protagonist, the existing set of character functions allows representation of different stories simply by shifting the protagonism to characters that do not succeed in the end. These have always existed as antagonists, and they can now become protagonists of tragic stories.

The second situation has consequences at two different levels. First, the Proppian set of character functions did not contemplate complications like fluctuating love relations or psychological development of characters. The multiplication of the number of possible schemas for plot arise from the consideration of instances of particular subsequences that present specific characteristics related to these features not contemplated by Propp. Some of these complications required a significant overhaul of the expressive power of the underlying computational system and can only be considered as further work.

Yet other complications would require only a dual process of generalization/instantiation of the character functions in the existing set to cover the missing features. Propp's set of character functions was developed for a very specific set of folk tales and it was not intended to be generalizaded beyond it. The concept of character function itself, in contrast, was defined as a generic tool for the analysis of narrative.

An extended set of character functions, satisfying Propp's requirements on the definition of a character function but covering the range of basic complications outlined in the present paper would be significant contribution to the field of narrative generation. The set of character functions developed by Propp has been tested repeatedly as a possible resource on which to base generic story telling system and has been found wanting [11]. The proposed extension might help to reduce the shortcomings perceived and increase the expressive potential of system based on a character function representation.

A further extension being contemplated as future work concerns the need for a flexible mechanism for combining meaningful sequences of character functions into larger narrative units, which would allow the system to capture more faithfully a larger set of the reviewed narrative schemas. A grammar-based solution such as the one outlined in [3] is being considered as a possible solution.

5 Conclusions

A number of existing descriptions of plot has been reviewed, and the resulting analises have been correlated to distill a basic vocabulary of narrative schemas. These narrative schemas have been paraphrased in terms of sequences of character functions as described in Propp's morphology. This has allowed the extension of an existing story generation system to generate output stories corresponding to the desired narrative schemas.

Important insights on the expressive power of Propp's morphology, and some discussion of its limitations as a generic story generation framework have been outlined. Limitations of Propp's morphology have been identified at three different levels. First, the sequencing and ordering of plot bearing elements/character functions as determined by Propp's formalism is too rigid to capture the flexibility of plots beyond Russian folk tales. Second, the set of abstractions for plot bearing elements/character functions would need to be extend, both with new elements and with additional annotations to existing ones, for instance regarding issues like gender of the characters, whether they survive the event, or whether the outcome is positive or negative for them. Third, an additional level of information concerning affinities between characters and/or psychological characteristics of the characters may need to be considered for dealing with Comedy plots as described by Booker or plots of the mind as described by Tobias.

The work reported in the paper is preliminary and ongoing, and several avenues of future work have been described. Some of these hold significant potential for improving both the quality of the resulting stories and the value of the proposed solution as a computational model of narrative.

Acknowledgements. This paper has been partially supported by the project WHIM 611560 funded by the European Commission, Framework Program 7, the ICT theme, and the Future Emerging Technologies FET program.

References

1 Alexander Nikolayevich Afanasyev. *Narodnye russkie skazki A. N. Afanaseva [Folk Russian tales of A. N. Afanasev]*, volume 1-3. Moscow, Nauka Publ, Moscow, 1855.

2 C. Booker. *The Seven Basic Plots: Why We Tell Stories*. The Seven Basic Plots: Why We Tell Stories. Continuum, 2004.

3 Pablo Gervás. Propp's morphology of the folk tale as a grammar for generation. In *Workshop on Computational Models of Narrative, a satellite workshop of CogSci 2013: The 35th meeting of the Cognitive Science Society*, Universität Hamburg Hamburg, Germany, 08/2013 2013. Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany, Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany.

4 Pablo Gervás. Reviewing Propp's story generation procedure in the light of computational creativity. In *AISB Symposium on Computational Creativity, AISB-2014, April 1-4 2014*, Goldsmiths, London, UK, 04/2014 2014.

5 S. Imabuchi and T. Ogata. A story generation system based on Propp combined with a conceptual dictionary. In *Natural Language Processing andKnowledge Engineering (NLP-KE), 2011 7th International Conference on*, pages 359–362, Nov 2011.

6 R. Raymond Lang. A declarative model for simple narratives. In *Proceedings of the AAAI Fall Symposium on Narrative Intelligence*, pages 134–141. AAAI Press, 1999.

7 G. Polti and L. Ray. *The Thirty-six Dramatic Situations*. Editor Company, 1916.

8 Vladimir Propp. *Morphology of the Folk Tale*. Akademija, Leningrad, 1928.

9 D. E. Rumelhart. Notes on a schema for stories. *Representation and Understanding: Studies in Cognitive Science*, pages 211–236, 1975.

10 R.B. Tobias. *20 Master Plots: And How to Build Them*. F+W Media, 2012.

11 Zach Tomaszewski and Kim Binsted. The limitations of a Propp-based approach to interactive drama. In *Intelligent Narrative Technologies, Papers from the 2007 AAAI Fall Symposium*, pages 167–173. AAAI Press, 2007.